

Mushroom fungi nutritional content biology essay



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INTRODUCTION

Mushrooms have been a component of our human diet since time immemorial. They were used as food before man understood the use of other organisms. Certainly mushrooms were one of man's most basic foods, and they were often considered an exotic and luxurious food reserved for the rich. Today mushrooms are food for both the rich and the poor. They can be grown anywhere as long as the conditions for their growth and cultivations are provided.

The word mushroom may have different meanings and perspectives in different literatures and geographical territories. Mushroom is defined as a macro fungus with distinct fruit body that can be either epigeous or hypogeous and large enough to be seen with naked eye and to be picked by hand. Mushroom is the fleshy, spore-bearing fruiting body of a fungus, typically produced above ground on soil or on its food source.

Mushrooms, a group known as fungi, lack chlorophyll and cannot therefore make its own food. It grows on dead organic matter either parasitically or symbiotically with other living organisms. Among the various mushroom species, button mushroom (*Agaricus bisporus*), oyster mushroom (*Pleurotus* species.), paddy straw (*Volvariella* species.), milky mushroom (*Calocybe Indica*) are most popular among the commercial growers.

Mushroom which is a fleshy saprophyte fungus are found growing on damp rotten log of wood trunk of trees, decaying organic matter and in damp soil rich in organic substances. Edible mushroom are highly nutritious and can be compared with eggs, milk and meat.

Mushrooms are rich in proteins, vitamins, and minerals and called as the vegetarian's meat. Mushroom proteins are considered to be intermediate between that of animals and vegetables (Kurtzman, 1976) as it contains all the nine essential amino acids which is required for human body.

Mushroom has a high protein content of 25-50%, fat (2-5%), sugars (17-47%), mycocellulose (7-38%), minerals (8-12%) and vitamins such as D, C, B1, B5, B6, niacin and riboflavin. Apart from serving as a protein food, for which they are most popular in Nigeria, mushrooms are also medicinal and have some biotechnology based functions.

Many of mushrooms produce a range of metabolites of intense interest to the nutraceutical and pharmaceutical (e. g. antitumour, immunomodulation agents, and hypocholesterol-aemic agents) and food (e. g. flavor compound) industries (Chang, 2007).

Many Asian countries use traditionally wild edible mushrooms as delicious and nutritional foods and medicine. Wild edible mushrooms are appreciated not only for texture and flavor but also for their chemical and nutritional characteristics (Sanmee et al., 2003). Cultivated mushrooms have higher protein contents and minerals, low in fat and rich in B vitamins, vitamin D, vitamin K and sometimes vitamins A and C.

Because of its oyster like shape Oyster mushroom (i. e. *Pleurotus* species.) is commonly called as Dhengri in India. Genus *Pleurotus* belongs to family Tricholomataceae and has about 40 well-recognized species, out of which 12 species are cultivated in different parts of country. *Pleurotus* is an efficient lignin-degrading mushroom and can grow well on different types of

lignocellulosic materials. Cultivation of this Mushroom is very simple and low cost which gives consistent growth with high biological efficiency. Different species of *Pleurotus* can grow well in variable temperature conditions; hence they are ideally suited for cultivation throughout the year in various regions of tropical country like India. Among the *Pleurotus* species, *P. sajor caju* had been widely studied for the cultivation followed by *P. ostreatus*. These studies mainly concentrated on the cultivation on wastes of forest and agricultural plants. Almost, all the available, lignocellulosic substances are likely be used as substrate for *Pleurotus* species. Cultivation with slightly variation in the range and combination of the substrates in different part of world based on their availability in abundant and being cheaper in the respective region. The technology can also limit air pollution associated with burning agriculture wastes as well as to decrease environmental pollution due to unutilized agricultural wastes.

Pleurotus species represents the third largest group of cultivated edible mushrooms in the world, grown on a variety of plant residues, and they have been found to be nutritionally and gastronomically important. They may be cultivated on a large number of substrates, according to local availability in different regions of the world. Most of these studies focused on the higher yield and quality of fruiting bodies of *Pleurotus* sp. with respect to cultivation times. The cultivation of edible mushrooms offers one of the most feasible and economic method for the bioconversion of agro-lignocellulosic wastes. One of the advantages of the *Pleurotus* group is their ability to grow on lignocellulosic substrates without the need for a composting or casing layer. Production techniques for these basidiomycetes are well developed and are

relatively simple, compared with those used for the most commonly cultivated mushroom. *Pleurotus* mushrooms, commonly known as oyster mushrooms, grow wild in tropical and sub-tropical areas, and are easily artificially cultivated. They are healthy foods, low in calories and in fat, rich in protein, chitin, vitamins and minerals. They also contain high amounts of γ -amino butyric acid (GABA) and ornithine. GABA is a non-essential amino acid that functions as a neurotransmitter whereas ornithine is a precursor in the synthesis of arginine. Extract of *P. ostreatus* was able to alleviate the hepatotoxicity induced by CCl₄ in rats and also the extract from *P. ostreatus* appeared to protect major organs such as the liver, heart, and brain of aged rats against oxidative stress. There are about 40 species of *Pleurotus* mushrooms and they rank second among the important cultivated mushrooms in the world.

The mushroom cultivation is a profitable agribusiness and Oyster mushroom (*Pleurotus ostreatus*) is an edible mushroom having excellent flavour and taste. It belongs to class Basidiomycetes, subclass Hollobasidiomycetidae, order Agaricales. It grows wild in the forests of hilly areas and is cultivated in temperate and subtropical regions of the world. The technology of artificial cultivation of mushroom is somewhat recent innovation; incorporation of non conventional crops in existing agricultural system can help in improving the social as well as economic status of small farmers. Mushrooms are the source of extraordinary power and virility and have medicinal properties like anticancerous, anticholesteral, antitumorous. Mushrooms are useful against diabetes, ulcer and lung diseases.

It can be grown on agricultural and industrial waste. These wastes can be recycled into food and environment may be less endangered by pollution (Hayes, 1978). Mushroom cultivation is highly labour intensive, short duration crop and land saving, can be welcomed by the poor farmers.

At present mushroom production is approximately 1.5 million tons in the world. Every year about 90 tons of mushrooms are exported to Europe from Pakistan. There is need to develop diversified agriculture in the Pakistan. It is unfortunate that in Pakistan and Azad Kashmir they have not caught the imagination of the public at large scale to become an important food item, perhaps the reason for not being taken up widely is non availability of mushrooms at low prices and lack of knowledge. The farmers should come forward to cultivate edible mushrooms like *Pleurotus ostreatus* (Oyster mushroom) on commercial scale to fulfill the requirements of balance diet.

The major problem associated with the transfer of technology for mushroom cultivation is the lack of technical know-how for its cultivation. During an investigation of the cultivation of mushroom on agricultural residues, it was found that rice husk sorghum stover, saw dust, cotton waste, cocoa bean shell, and sawdust – *Gliricidia* mixture are suitable substrates for the cultivation of edible mushroom.

Oyster mushrooms (*Pleurotus* species), the third largest commercially produced mushroom in the world are found growing naturally on rotten wood material. The growing increase in consumption of oyster mushroom is largely due to its taste, medicinal and nutritional properties. *Pleurotus ostreatus* is one of the most produced species, cultivated mainly on sawdust. The

unavailability of sawdust and the fact that felling of trees in most regions of the world is prohibited makes it imperative that other sources of substrates be utilised for its cultivation. In the tropics and sub-tropics, large volumes of unused lignocellulosic byproducts can be found. These byproducts are left to rot in the field or are disposed of through burning. Cultivation of mushrooms on these by-products may be one of the solutions to transforming these inedible wastes into accepted edible biomass of high market value.

Oyster mushrooms are grown from mycelium (threadlike filaments that become interwoven) propagated on a base of steam-sterilized cereal grain (usually rye or millet). This cereal grain/mycelium mixture is called spawn and is used to seed mushroom substrate. Most spawn is made with mycelium from a stored culture, rather than mycelium whose parent was a spore. This is because spores are likely to yield a new strain and performance would be unpredictable. Spawn-making is a rather complex task and not feasible for the common mushroom grower. Spawn of various oyster mushroom species may be purchased from commercial spawn makers who usually provide instructions for its use. Spawn frequently is shipped from the manufacturer to growers in the same aseptic containers used for spawn production. Inoculum for spawn production is frequently produced in polyethylene bags containing a microporous breather strip for gas exchange. Most commercial spawn production companies produce spawn only from inoculum that has met strict quality control standards. These standards include verification of inoculum production performance before it is used to produce spawn and insurance of the spawn's biological purity and vigor.

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Pakistan is an agricultural country having 70% of its manpower engaged directly or indirectly in agriculture sector but unfortunately we are not able to sustain our agriculture on strong basis. It requires a long term planning to increase our area under cultivation converting barren and arid areas into fertile lands. In such circumstances small cottage industry like mushroom cultivation as well as commercial cultivation will not only ameliorate the miserable conditions of our poor farmers but on the other hand will become a source of foreign exchange. Oyster mushroom is quite easy to cultivate is compared to its other relatives and has more nutritional and medicinal value as compared to vegetables.

Oyster mushroom cultivation can play an important role in managing organic wastes whose disposal has become a problem. Malnutrition is a problem in developing countries, Mushrooms with their flavour, texture; nutritional value and high productivity per unit area have been identified as an excellent food source to alleviate malnutrition in developing countries.

The oyster mushroom *Pleurotus* species is a saprophytic fungus commercially cultivated throughout the world because of its tasty basidiocarp and simple cultivation technology. It is also one of the choicest white rot fungi for research scientists to investigate. *Pleurotus* species lignocellulolytic enzymes for bioremediation (Arisoy and KalanKayan 1997) its flavour compounds, (Mau et al., 1998). Oyster mushrooms are mainly cultivated on residues from agricultural crops such as wheat, paddy, cotton, sugar cane or soybean.

Consumption of edible mushrooms as food and drug is closely related to the history of mankind. Recently, oyster has been added to the list of commercially produced mushrooms. Edible mushrooms are cultivated worldwide under various climatic conditions. Their total annual production in the world is well over 1. 2 million tons. These

mushrooms are grown on commercial scale in several countries. However, no systematic start has been made to grow them in Pakistan, which has varied climatic zones and abundance of manpower and agro-waste resources. There are about 5000 different species of mushrooms, of which at least 1220 are reported to be edible.